

Claims

1. (currently amended) A computer implemented method, comprising,
using at least two ~~of~~ sets of parameters comprising rate data and buffer size data to determine an operating condition by selecting:

- 1) a buffer size based on the rate data; or
- 2) a rate based on the buffer size data;

and

at a time-varying-signal decoder, maintaining encoded data in a buffer in accordance with the operating condition and decoding the encoded data from the buffer.

2. (original) The method of claim 1 further comprising, receiving the at least two sets of parameters at the time-varying-signal decoder, wherein the time-varying-signal decoder determines the operating condition.

3. (currently amended) The method of claim 2 wherein each of the at least two sets set of parameters also includes fullness data received at the time-varying-signal decoder.

4. (original) The method of claim 2 wherein the at least two sets of parameters are determined by an encoder.

5. (original) The method of claim 4 wherein the at least two sets of parameters are received in a stream header along with information indicating a total number of the sets.

6. (currently amended) The method of claim 1 wherein using at least two ~~of~~ sets of parameters to determine an operating condition includes selecting one of the sets.

7. (currently amended) The method of claim 1 wherein using at least two ~~of~~ sets of parameters to determine an operating condition includes interpolating between data points in at least two of the sets.

8. (currently amended) The method of claim 1 wherein using at least two of sets of parameters to determine an operating condition includes extrapolating from data points in at least two of the sets.

9. (original) The method of claim 1 wherein selecting a buffer size based on the rate data comprises determining a buffer size that will approach a minimum loading delay.

10. (currently amended) The method of claim 1 wherein selecting a rate based on the buffer size data comprises determining a minimum required peak transmission rate based on the buffer size data.

11. (original) The method of claim 1 wherein the operating condition changes at least once during communication of the encoded data to the buffer.

12. (currently amended) A computer implemented method, comprising,
at a time-varying-signal decoder, receiving at least two sets of parameters comprising rate and buffer size data;
using at least two of the sets of parameters to determine an operating condition by selecting:
1) a buffer size based on the rate data; or
2) a rate based on the buffer size data;
maintaining encoded data in a buffer in accordance with the operating condition; and
decoding the encoded data from the buffer.

13. (currently amended) The method of claim 12 further comprising ~~providing~~ receiving fullness data with the sets of parameters at ~~to~~ the time-varying-signal decoder.

14. (original) The method of claim 12 further comprising, determining the at least two sets of parameters and providing them to the time-varying-signal decoder.

15. (original) The method of claim 14 wherein the at least two sets of parameters are determined by an encoder.

16. (currently amended) The method of claim ~~15~~ 12 wherein the at least two sets of parameters are received in a stream header along with information indicating a total number of the sets.

17. (currently amended) The method of claim 12 wherein using at least two of the sets of parameters to determine an operating condition includes selecting one of the sets.

18. (currently amended) The method of claim 12 wherein using at least two of the sets of parameters to determine an operating condition includes interpolating between data points in at least two of the sets.

19. (currently amended) The method of claim 12 wherein using at least two of the sets of parameters to determine an operating condition includes extrapolating from data points in at least two of the sets.

20. (original) The method of claim 12 wherein selecting a buffer size based on the rate data comprises determining a buffer size that will approach a minimum loading delay.

21. (currently amended) The method of claim 12 wherein selecting a rate based on the buffer size data comprises determining a minimum required peak transmission rate based on the buffer size data.

22. (original) The method of claim 12 wherein the operating condition changes at least once during communication of the encoded data to the buffer.

23. (currently amended) A system for providing time varying signals, comprising:
an encoder that provides time-varying signals;
an encoder buffer and a decoder buffer that maintain the time-varying signals, the encoder buffer connected to the decoder buffer by a transmission medium;
a decoder that removes the time-varying signals from the decoder buffer; and

a first mechanism that determines at least two of sets of parameters comprising rate data and buffer size data for maintaining the decoder buffer such that it does not overflow or underflow, and
a second mechanism that determines a size of the decoder buffer based on the rate data, or determines a rate of transferring data from the encoder buffer to the decoder buffer based on the buffer size data.

24. (currently amended) The system of claim 23 wherein the first mechanism that determines the at least two of sets of parameters is incorporated in the encoder.

25. (original) The system of claim 23 wherein the second mechanism is incorporated in the decoder.

26. (currently amended) The system of claim 23 wherein the first mechanism ~~that determines at least two of sets of parameters~~ is incorporated in the encoder, the second mechanism is incorporated in the decoder, and wherein the encoder communicates the sets of parameters to the decoder.

27. (original) The system of claim 26 wherein the encoder communicates the sets of parameters to the decoder via a stream header.

28. (original) The system of claim 26 wherein the encoder identifies a total number of the sets of parameters.

29. (currently amended) The system of claim 23 wherein each ~~set~~ of the at least two sets of parameters also includes fullness data ~~received at the decoder~~.

30. (original) The system of claim 23 wherein the second mechanism determines the size of the decoder buffer based on the rate data, or determines the rate of transferring data, by selecting one of the sets.

31. (original) The system of claim 23 wherein the second mechanism determines the size of the decoder buffer based on the rate data, or determines the rate of transferring data, by interpolating between data points in at least two of the sets.

32. (original) The system of claim 23 wherein the second mechanism determines the size of the decoder buffer based on the rate data, or determines the rate of transferring data, by extrapolating from data points in at least two of the sets.

33. (currently amended) The system of claim 23 wherein the second mechanism determines the size of the decoder buffer ~~by determining a buffer size~~ that will approach a minimum loading delay.

34. (currently amended) The system of claim 23 wherein the second mechanism determines the rate of transferring data by determining a minimum required peak transmission rate corresponding to a predetermined buffer size.

35. (original) The system of claim 23 wherein the second mechanism determines a new size of the decoder buffer based on the rate data and time information.

36. (currently amended) The system of claim 23 wherein the second mechanism determines a new rate of transferring data based on the buffer size data ~~size~~ and time information.

37. (new) The method of claim 6 wherein selecting one of the sets comprises comparing the at least two sets to each other or to some other set of parameters.

38. (new) The method of claim 17 wherein selecting one of the sets comprises comparing the at least two sets to each other or to some other set of parameters.

39. (new) A computer-implemented method comprising:
receiving in a bitstream at least two sets of parameters, each set of parameters comprising rate data and decoder buffer size data;

processing the sets of parameters; and
receiving and decoding encoded video data in the bitstream.

40. (new) The method of claim 39 wherein each of the at least two sets of parameters comprises a maximum transmission rate, a decoder buffer capacity, and an initial buffer fullness.

41. (new) The method of claim 39 wherein processing the sets of parameters comprises using the sets of parameters to determine an operating condition for maintaining the encoded video data in a decoder buffer.

42. (new) The method of claim 41 wherein using the sets of parameters comprises selecting one of the sets by comparing the sets to each other or to some other set of parameters.

43. (new) The method of claim 39 wherein the at least two sets of parameters are received in a header of the bit stream.

44. (new) The method of claim 39 wherein the processing the sets of parameters includes reading the sets from the bit stream.

45. (new) The method of claim 39 further comprising receiving in the bitstream information indicating how many sets of parameters are in the at least two sets of parameters.

46. (new) A computer-implemented method comprising:
at an encoder, processing video data to produce encoded video data and hypothetical reference decoder information, the hypothetical reference decoder information comprising at least two sets of parameters, each of the at least two sets of parameters comprising rate data and decoder buffer size data;
outputting the sets of parameters in a bit stream; and
outputting the encoded video data in the bit stream.

47. (new) The method of claim 46 wherein each of the at least two sets of parameters comprises an initial decoder buffer fullness, a peak transmission rate to a decoder, and a decoder buffer size.

48. (new) A computer-implemented method comprising:
receiving one or more initial sets of parameters in a bit stream, each of the one or more initial sets of parameters comprising rate data, decoder buffer size data, and decoder buffer fullness data;
processing the one or more initial sets of parameters;
receiving and decoding encoded video data in the bit stream; and
while decoding the encoded video data in the bit stream, receiving and processing at least one additional set of one or more parameters from later in the bitstream, the one or more parameters comprising one or more of rate data, decoder buffer size data, and decoder buffer fullness data.

49. (new) The method of claim 48 wherein the at least one additional set of one or more parameters is different from each of the one or more initial sets of parameters.

50. (new) The method of claim 48 wherein the one or more one initial sets of parameters comprise plural sets of parameters.

51. (new) The method of claim 48 wherein the one or more initial sets of parameters are received in an initial stream header of the bit stream.

52. (new) The method of claim 48 wherein the processing includes reading from the bit stream.

53. (new) The method of claim 48 further comprising receiving in the bitstream information indicating how many sets of parameters are in the one or more initial sets of parameters.

54. (new) The method of claim 48 wherein the processing the one or more initial sets of parameters comprises setting an operating condition based at least in part upon the one or more

initial sets of parameters, and wherein the processing at least one additional set comprises changing the operating condition based at least in part upon the at least one additional set.

55. (new) The method of claim 54 wherein the operating condition indicates how to maintain a decoder buffer during the decoding of the encoded video data.

56. (new) A computer system comprising:
a decoder buffer that receives and maintains encoded data in a bit stream;
a decoder that removes the encoded data from the decoder buffer and decodes the encoded data; and
a mechanism that receives and processes at least two sets of buffer management parameters, each of the at least two sets of parameters comprising rate data, decoder buffer size data, and decoder buffer fullness data.

57. (new) The system of claim 56 wherein the rate data comprises a maximum transmission rate, the decoder buffer size data comprises a decoder buffer capacity, and the buffer fullness data comprises an initial buffer fullness.

58. (new) The system of claim 56 wherein the mechanism processes the sets of parameters by using the sets of parameters to determine an operating condition.

59. (new) The system of claim 58 wherein decoding the video data comprises maintaining encoded data in the decoder buffer in accordance with the operating condition and decoding the encoded data from the decoder buffer.

60. (new) The system of claim 58 wherein using the sets of parameters comprises selecting one of the sets by comparing the at least two sets to each other or to some other set of parameters.

61. (new) The system of claim 56 wherein the at least two sets of parameters are part of an initial stream header for the bit stream.

62. (new) The system of claim 56 wherein the processing by the mechanism includes reading the sets from the bit stream.

63. (new) The system of claim 56 wherein the mechanism further receives and processes information indicating how many sets of buffer management parameters are in the at least two sets of buffer management parameters.